



Department of Energy

ROCKY FLATS FIELD OFFICE
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GOLDEN, COLORADO 80403-8200

FEB 15 2001

01-DOE-00267

Mr. Steve Gunderson
Rocky Flats Cleanup Agreement Project Coordinator
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1530

Dear Mr. Gunderson:

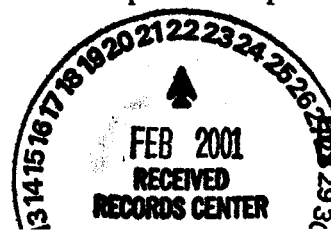
This letter is in response to the December 20, 2000, letter from the Colorado Department of Public Health and Environment (CDPHE) concerning Exceedences of Surface Water Plutonium (Pu) Standards at SW027 (June 26-29, 2000) and GS08 (September 14, 2000).

The Department of Energy (DOE) and its contractor, Kaiser-Hill Company, L.L.C. (K-H) evaluated your suggestions contained in the referenced letter, to wit:

1. Refine the source investigation process associated with standards exceedences at Rocky Flats Cleanup Agreement (RFCA) Points of Compliance (POCs) and Points of Evaluation (POEs). Specifically, you suggested that source evaluations could be refined to include examination of the potential relationship between high intensity storm events and POE/POC exceedences and proposed reviewing a suite of data that you considered valuable to such an effort.
2. The CDPHE also reminded DOE that work on a watershed rehabilitation "pilot" project in the GS27 sub-drainage should be implemented.
3. Also, CDPHE requested additional surface water data be provided related to precipitation events and exceedences.
4. Finally, CDPHE recommended that a routine meeting be held, perhaps quarterly, to focus on POE/POC exceedences.

Items numbered 1 and 2 are addressed below and in the Enclosure 1. To address item number 3, we have included a brief discussion of the proposed and ongoing source evaluation efforts for monitoring locations SW027, GS08, and GS10; a summary of Actinide Migration Evaluation (AME) activities related to actinide transport mechanisms; and an electronic data deliverable (compact disc enclosed) with requested environmental data and instructions for acquiring additional data not included herein.

Furthermore, additional precipitation data can be obtained from the Site regarding the 51m meteorological tower (contact Patrick Haines, x7240, patrick.haines@rfets.gov). Corresponding location-specific flow measurement and analytical data for each composite sample can be



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obtained from the Integrated Sitewide Environmental Data System (ISEDS). Composite sample analytical results are found under ISEDS\Surface Water\Analytical Results, and flow data are found under ISEDS\Surface Water\Cont. Monitoring Field Results. Data are grouped by month and year for all locations, with duplicate data subsets for POEs and POCs available. Each download includes an Adobe PDF file with detailed descriptions of the data fields.

With respect to item number 4, we have already agreed to use periodic (quarterly to begin with) RFCA Project Coordinators meetings as the venue to discuss POE/POC exceedences. Also, these topics can be included in the discussions held by the already established Water Working Group meetings that coincide with the Quarterly Information Exchange meetings.

The DOE and K-H examined the potential benefits of pursuing CDPHE's suggested refinements, analyzed alternatives, and developed recommendations that are included in the enclosed response. However, we believe it is important that some key points be clarified to assure that CDPHE, DOE and K-H are approaching the issue(s) with the same fundamental understandings:

- The RFCA source investigations are focused on identifying the *locations* of potential sources that may contribute to exceedences of RFCA surface water standards.
- Transport mechanisms of potential Pu/Am/U contaminants in soils/surface water are being addressed by the Actinide Migration Evaluation (AME) group and any data generated from Source Evaluations related to transport mechanisms is forwarded to the AME for their consideration.
- Data examined to date through source investigations indicate there are no clearly defined "hot spots", but diffuse soil contamination offers the most plausible explanation for the source(s) of contamination.
- In general, data examined to date indicates there is a qualitative relationship between high-intensity storm events and exceedences; however, no definitive quantitative relationship can be drawn from the data.
- Key parameters besides storm intensity that should be examined include the mechanisms for aggregation and disaggregation of soil particles, storm duration and antecedent soil moisture conditions.
- Any approach to source investigation data collection/analysis to identify sources of contamination in soils needs to not only respond to RFCA reporting requirements, but support the key studies needed to help define the end state of the site at closure. This includes the Water Balance, Erosion model, and Final Land Configuration Design Basis studies.

With these understandings in mind, we believe the information contained in the enclosed document and electronic data deliverable (Enclosure 2-compact disk) can both clarify and address CDPHE's concerns.

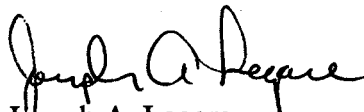
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In consultation with your staff, we are available to discuss these issues or the data at your convenience. If you have any questions regarding this transmittal, please contact me at (303) 966-5918 or Glenn Doyle at (303) 966-3087.

Sincerely,



Joseph A. Legare
Assistant Manager
for Environment and Infrastructure

Enclosures:

1. Rocky Flats Environmental Technology Site Source Evaluations
2. Electronic Data Deliverable (Compact Disk)
3. Flow and Water Transfer Schematic

cc:

G. Doyle, EI, RFFO
J. Stover, EI, RFFO
G. Hill, EI, RFFO
R. DiSalvo, EI, RFFO
D. Shelton, K-H
L. Brooks, K-H
T. Rehder, EPA
Administrative Record

Rocky Flats Environmental Technology Site (RFETS) Source Evaluations

Since the October 1996 start of RFCA monitoring, the Site has undertaken source evaluation investigations for GS03, GS10, SW027, and SW093. Results of these source evaluations were documented in project reports detailing the data evaluations and investigation findings. All reports are available online through the Rocky Flats Environmental Data Dynamic Information Exchange (EDDIE) WEB site as downloadable Adobe PDF files. The primary goal of these source evaluations was to identify the *location* of tributary sources that may have contributed actinides resulting in the measurement of reportable 30-day average activities at the above POEs/POCs. Investigations regarding the transport mechanisms for actinides in surface water were employed where the results were expected to provide insight in identifying the *location* of actinide sources, with the specific transport mechanisms being secondary in nature. Any source evaluation results relating to transport mechanisms were communicated to AME investigators, with the primary goal of investigating actinide transport science reserved for the AME.

SW027 Source Evaluation

Since the initiation of RFCA monitoring at POE SW027, there have been two periods of reportable 30-day average activities for Pu: May – August 1998 and July – August 2000. The 1998 reportable period was addressed in a comprehensive effort that produced the *Source Evaluation Report for Point of Evaluation SW027*, Revision 0, October 1998. While specific analyses including precipitation parameters (other than daily precipitation depth) were not conducted, comparative assessment was performed using average and peak flow rates as indicators of storm intensity. These assessments did not yield conclusive quantitative correlations to actinide transport; however, qualitative assessment did indicate that larger storm events generally resulted in increased transport. Regardless, all other data assessment indicated that diffuse actinide contamination originating with the 903 Pad Area was the likely source of the Pu measured at SW027.

Given the conclusions of the 1998 Report, coupled with the fact that SW027 sub-drainage characteristics have seen minimal changes since that time, it is likely that the same transport mechanisms are applicable to the 2000 reportable period. However, a walk-down of the area subsequent to the reportable period gave no indication of significant overland flow from the areas most contaminated by actinides from the 903 Pad. In all likelihood, the origin of the Pu recently measured at SW027 is re-suspension of South Interceptor Ditch (SID) sediments by tributary flows from impervious areas in the Industrial Area (IA) (400 Area). Therefore, the Site will address the recent reportable values with a POE SW027 letter report limited to the following:

- A final monitoring-data summary for the year 2000 reportable period;
- An assessment of storm-runoff flow rates and SID sediment activities as related to re-suspension; and
- A review of Site activities within the SW027 sub-drainage area.

GS08 Source Evaluation

A formal source evaluation plan was submitted to CDPHE on December 28, 2000 (i.e., *Source Evaluation Plan for Rocky Flats Cleanup Agreement (RFCA) Point of Compliance GS08*) to investigate probable causes of GS08 RFCA reportable values. For the GS08 Source Investigation, the Site proposed the following:

- Continued monitoring at GS08 to assess trends;
- Completion of the current Source Evaluation activities for GS10; and
- Per the Source Evaluation Plan: further evaluate the accuracy of GS08 analytical results, review Site activities directly affecting Pond B-5, determine the appropriate numerical precision for analytical reporting, and assess sediment in Pond B-5 and the stream reach between GS10 and the Pond B-5 outlet (GS08).

Given the controlled discharge rates from Pond B-5, the batch management of discharge volumes, and the attenuation of storm events through B-5 during discharge, a quantitative assessment of GS08 analytical results compared to precipitation parameters would not be expected to provide information useful to locating specific sources. AME investigators are implementing studies to assess the settling mechanisms for actinides in Pond B-5, which could be combined with predicted flows to assess the applicability of settling basins as management tools for attenuation of actinide transport.

Since the initiation of RFCA monitoring at POC GS08, there have been two elevated Pu sample results. For the same period, there was a single elevated Am sample result. Of these, only the Pu result from August 2000 resulted in a reportable 30-day average activity (one day at 0.151 pCi/L Pu). In all three cases the analytical results from composite samples collected immediately prior were all significantly less than the minimum detectable activity (MDA). For this reach of South Walnut Creek, the typical Pu-Am concentration ratio is 1:3. In two cases, Pu/Am ratios were abnormal for Site surface waters: 20:1 and 1:34. Given the fact that little overland flow directly enters Pond B-5 relative to the contributions from the Wastewater Treatment Plant (WWTP) and GS10 (via the B-1 Bypass Pipeline) see Enclosure 3, coupled with the frequent reportable activities at GS10, it is probable that the Pu measured at GS08 originated upstream of GS10.

GS10 Source Evaluation

Since the initiation of RFCA monitoring at POE GS10 there have been multiple periods of reportable 30-day average activities for both Pu and Am. The current source evaluation effort has been ongoing since the summer of 1997. This source evaluation has produced five Source Evaluation Reports that addressed GS10 reportable values. While the analysis did not specifically include precipitation parameters, a comparative assessment was performed using average and peak flow rates as indicators of storm intensity. These assessments did not yield strong quantitative correlations to actinide transport; however, qualitative assessment did indicate that larger storm events generally resulted in increased transport.

With the reportable values at GS10 during 1999, the Site continued the ongoing Source Evaluation with activities outlined in the *Sampling and Analysis Plan for Automated Synoptic Surface-Water and Sediment Sampling for the GS10 Source Investigation*, March 2000. This plan included proposed analysis of correlations between analytical water-quality measurements and precipitation parameters. Specifically related to precipitation parameters, the Kaiser-Hill Team will:

- Assess the correlation of total sub-drainage precipitation depth during each sampling period with sample activity;
- Assess the correlation of average sub-drainage precipitation intensity (in/hr) during each sampling period with sample activity;
- Assess the correlation of peak sub-drainage precipitation intensity (in/hr) during each sampling period with sample activity;
- Assess the correlation of normalized peak sub-drainage precipitation intensity (peak intensity/average intensity; dimensionless) during each sampling period with sample activity;
- Assess the spatial variability of the above precipitation parameters with sample Pu/Am ratios in an attempt to discern spatial trends as an indication of source location; and
- Assess the spatial variability of the above precipitation parameters with sample activity in an attempt to discern spatial trend as an indication of source location.

Actinide Migration Evaluation: Transport Studies

The AME is continuing to do research on surface-water transport of actinides to determine the mechanisms responsible for introduction of actinides into runoff and removal of actinides from the water column in the detention ponds. Dr. Peter Santschi, et al. (Texas A&M University) are studying the phase distribution and the environmental processing of actinides in the colloidal and particulate phases. Dr. James Ranville et al. (Colorado School of Mines) has provided data on the structure of soil aggregates and the particle-size distribution of the actinides in Site soils.

The AME team will continue to explore the mechanisms by which actinide-containing particles are transported in the runoff by studying soils in the GS27 drainage area. Three soil / sediment samples will be collected upstream from GS27 this winter for shipment to Dr. Santschi for his experiments. The GS27 soil will be re-suspended in different wash solutions followed by separation of the colloidal-sized particles and analysis of the colloidal fractions for Pu and Am.

In addition, Dr. Larry Hersman (Los Alamos National Laboratory [LANL]) will be investigating the effects of organic materials that are thought to help aggregate soils. Breakdown of the aggregates by mechanical means (e.g. wetting-drying or freeze-thaw) has the potential to cause transition of the actinides to a smaller particle size distribution. Therefore wet-dry and freeze-thaw cycles may be important predictors of actinide transport in addition to rainfall intensity, depth, and duration.

AME FY00 work also concluded that the particle residence time in Pond B-5 water column is about one day. Particles smaller than about 2 μ m are not likely to settle in detention ponds without aggregation / coagulation to form larger particles. Therefore, a preliminary mechanism may be suggested whereby about 90 percent of the particles containing actinides will settle out in the detention ponds, but the remaining 10 percent are discharged from the ponds as colloids. AME will measure the settling time of particles in Ponds A-3 and C-2 in FY01 to compare to the FY00 Pond B-5 results. This study will provide insight to whether the Building 995 wastewater effluent enhances particle settling in Pond B-5 due to input of microorganisms, organic carbon, and nutrients.

The overall goal of the AME studies is to help protect surface-water quality in accordance with RFCA requirements at regulatory closure. In the mean time, the AME studies will continue to work with the Water Monitoring Group to provide information to improve Site water-quality.

GS27 Watershed Rehabilitation Pilot Study

The Kaiser-Hill Team and DOE continue to characterize the GS27 sub-drainage area in an effort to identify actinide transport mechanisms. As stated above, the AME will be collecting three soil/sediment samples upstream from GS27 this winter for laboratory re-suspension and separation of the colloidal fractions and subsequent Pu and Am analysis. This study may provide information to aid in the design of watershed modifications that could be implemented by a pilot project in the GS27 sub-drainage to control movement of actinides in surface water.

Data Transmittal

Please find the enclosed CD-ROM with the following information:

- A 'readme' file describing disk contents;
- A summary of all POC and POE composite samples collected under RFCA protocols (10/1/96 to date) including sample number and sampling period with individual results greater than 0.15 pCi/L indicated;
- A description and map of the 12 precipitation gages operated as part of the automated surface-water monitoring network during RFCA monitoring (10/1/96 to date); and
- All available 5- and 15-minute interval precipitation data from the above gages.

